ITW CASE 14264

INFLATION VALVE ASSEMBLY FOR A DUNNAGE OR CARGO AIR BAG

FIELD OF THE INVENTION

The present invention relates generally to dunnage air bags, and more particularly to a new and improved inflation valve assembly for facilitating the inflation of an inflatable bladder disposed interiorly of, or comprising, a dunnage air bag for use in connection with securing or bracing cargo within the holds of, for example, railroad cars, airplanes, ships, truck trailers, and the like.

BACKGROUND OF THE INVENTION

Cargo or dunnage air bags are used within the cargo shipment or transportation industry as a means for readily and easily securing or bracing cargo within the holds of, for example, railroad cars, ships, airplanes, truck trailers, and the like. Such dunnage or cargo air bags conventionally comprise an inflatable bladder which is enclosed within an outer bag or envelope which is conventionally fabricated from a plurality of paper plies. The air bags are conventionally of such construction and size as to readily enable the same to

be inserted into voids or spaces defined between spaced loads, or between a particular cargo load and a side or end wall of the cargo container or hold, whereupon inflation of the air bag, the air bag will expand thereby fixedly engaging the adjacent cargo loads, or the cargo load and container wall, so as to secure the cargo loads against undesirable movement during transit. Obviously, in order to achieve the inflation of the cargo or dunnage air bags to a predetermined pressurized level, such air bags are also conventionally provided with an inflation valve assembly so as to permit pressurized air or compressed air to be conducted into the interior portion of the inflatable bladder so as to inflate the same, or to permit the pressurized air or compressed air, already disposed within the inflated bladder, to be conducted out from the interior portion of the inflatable bladder so as to deflate the same.

A first conventional **PRIOR ART** inflation valve assembly is disclosed, for example, within **FIGURE 1** which substantially corresponds to the inflation valve assembly portion of **FIGURE 2** as illustrated within **United States Patent 5,042,541** which issued to **Krier et al**. on August 27, 1991, and it is seen that this inflation valve assembly utilizes a spring-biased valve stem mechanism. More particularly, as can be readily appreciated from **FIGURE 1**, a cargo air bag is generally indicated by the reference character 10 and is seen to comprise a paper bag 11 and an inflatable bladder 62. The inflation valve assembly is generally indicated by the reference character 12 and is seen to comprise a tubular valve body 56 defining a hollow space 57 therewithin, and an annular flange portion 60 integrally fixed thereto. The tubular

valve body 56 is adapted to be inserted through an aperture defined within a wall 58 of the cargo air bag 10 such that the free distal end 80 of the valve body 56 projects outwardly from the cargo air bag 10 so as to be externally accessible for fluidic communication with a suitable air inflation fixture or assembly by means of which the compressed or pressurized air can be conducted into the interior portion of the inflatable bladder 62. An external annular shoulder portion 66 of the valve body 56 engages an outer surface of the air bag 10, while the annular flange portion 60 is adapted to be ultrasonically welded to an interior wall portion of the inflatable bladder 62 so as to form an air-tight seal therewith.

The inflation valve assembly 12 also comprises a valve stem 70 which extends through the hollow space 57 of the valve body 56. A closure plate 72 is disposed upon a first end of the valve stem 70, and a spring member 76 is interposed between an internal shoulder portion of the valve body 56 and a second opposite end 78 of the valve stem 70. An annular valve seat 64 is defined upon an interior portion of the valve body 56, and an annular ridge 74 is defined upon the closure plate 72. Accordingly, the spring member 76 normally biases the closure plate 72 and its annular ridge 74 onto the valve seat 64 such that the inflation valve assembly 12 may be disposed in a first **CLOSED** position or state whereby pressurized air or compressed air cannot be conducted into the interior of the inflatable bladder 62, or alternatively, pressurized air or compressed air, already contained within the inflated bladder 62, is not permitted to escape from the inflated bladder 62. Conversely, when a force is imposed upon

the free end portion 78 of the valve stem 70, the valve stem 70 is axially moved against the biasing force of spring member 76 such that the closure plate 72 and its annular ridge 74 are moved away from the valve seat 64 such that the inflation valve assembly 12 may be disposed in a second **OPENED** position or state whereby pressurized air or compressed air can be conducted into the interior of the inflatable bladder 62, or alternatively, pressurized air or compressed air already contained within the inflated bladder 62 is permitted to escape from the inflated bladder 62.

In lieu of the spring-biased valve stem mechanism as disclosed within **Krier et al.**, the inflation valve assembly may alternatively comprise a flapper valve member which is mounted upon the inner end portion of a tubular valve body so as to likewise be movable between, for example, a first **CLOSED** position or state, either by means of the inherent resiliency of, for example, a living hinge structure, or as a result of being biased to the **CLOSED** position or state by means of the internal pressure within the inflatable bladder when the interior portion of the inflatable bladder has actually been pressurized, whereby the internal pressurized air is able to be effectively and sufficiently retained within the interior of the inflatable bladder of the dunnage or cargo air bag until, for example, an external closure cap is able to be threadedly engaged upon the inflation valve assembly so as to effectively close and seal the inflation valve assembly, and a second **OPEN** state or position as a result of, for example, being manually manipulated whereby the flapper valve member is able to effectively be moved away from its valve seat formed upon a nipple portion of the inflation

valve assembly so as to permit an inflation nozzle to be fluidically mated therewith whereby pressurized air or compressed can be introduced into the interior of the inflatable bladder of the dunnage or cargo air bag. A second conventional **PRIOR ART** inflation valve assembly, comprising a flapper valve member, is disclosed, for example, within **FIGURES 2-4** and is generally indicated by means of the reference character 10.

More particularly, with reference being made to **FIGURES 2-4**, it is seen that the second conventional **PRIOR ART** inflation valve assembly 10 comprises an annular flange member 12 wherein, for example, the undersurface portion 14 of the annular flange member 12 is adapted to be heat-sealed to an interior surface portion of the inflatable bladder while an externally threaded nipple portion 16 of the inflation valve assembly 10 is adapted to project outwardly through means of a suitable aperture formed within the ply of the inflatable bladder, as well as suitable apertures formed within the one or more paper plies comprising the dunnage or cargo air bag. In this manner, when a suitable inflation nozzle, not shown, is fluidically connected to the nipple portion 16 of the inflation valve assembly 10, pressurized air or compressed air can be conducted into the interior of the inflatable bladder so as to inflate the same. In addition to the aforenoted structure, characteristic of the second conventional **PRIOR ART** inflation valve assembly 10, it is further seen that the second conventional **PRIOR ART** inflation valve assembly 10 also has an annular upstanding ring member 18 integrally disposed upon the upper surface portion 20 of the annular flange member 12. As can best be appreciated from

FIGURE 4, a substantially planar, disc-type flapper valve member 22, having a substantially circular configuration, has an end portion 24 which is adapted to be fixedly secured upon an arcuate portion 26 of the annular upstanding ring member 18 by means of a fixation bar 28 which extends along a chordal extent of the annular upstanding ring member 18.

As can best be seen from **FIGURE 3**, the radially interior peripheral wall portion of the annular upstanding ring member 18 is provided with an inner flange member 30 which effectively serves as a valve seat for the substantially planar, disc-type flapper valve member 22 when the flapper valve member 22 is disposed in its **CLOSED** position or state as shown in **FIGURE 2**. It is also noted that the substantially planar, disc-type flapper valve member 22 is fabricated from a suitable rubber composition, and accordingly, that portion of the substantially planar, disc-type flapper valve member 22 which is disposed immediately adjacent to the fixation bar 28, inherently defines a living hinge portion 32 by means of which the flapper valve member 22 is adapted to be readily pivotally moved between its **OPENED** and **CLOSED** positions as respectively disclosed in **FIGURES 3** and **4**, and **FIGURE 2**. As can be additionally appreciated from **FIGURES 3** and **4**, the annular upstanding ring member 18 is provided with a plurality of circumferentially spaced, upstanding projections or ears 34, and it is seen that when the substantially planar, disc-type flapper valve member 22 is moved from its **CLOSED** position as illustrated in **FIGURE 2**, to its fully **OPENED** position as illustrated within **FIGURES 3** and **4**, opposite side portions of the flapper valve member 22 will encounter the upstanding projections or ears 34 which are disposed adjacent to the op-

posite ends of the fixation bar 28, the opposite side portions of the flapper valve member 22 will accordingly be partially deformed as a result of being compressed radially inwardly by means of such upstanding projections or ears 34, and the flapper valve member 22 will therefore effectively be able to be moved past such upstanding projections or ears 34. Subsequently, once the flapper valve member 22 has in fact moved past such upstanding projections or ears 34, the side portions of the flapper valve member 22 will effectively regain their normal, non-compressed state such that the upstanding projections or ears 34 will serve to retain the flapper valve member 22 at its **OPENED** position or state as illustrated in **FIGUERS 3** and **4**. In this manner, the inflation valve assembly 10 is then able to have an inflation nozzle member, not shown, fluidically mated with the nipple portion 16 of the inflation valve assembly 10 so as to facilitate inflation of the inflatable dunnage or cargo air bag bladder. It is lastly noted, as can best be appreciated from **FIGURE 3**, that in order to manually manipulate the flapper valve member 22 and move the same from its **CLOSED** position as illustrated in **FIGURE 2**, to its fully **OPENED** position as illustrated in **FIGURES 3** and **4**, the external or undersurface portion of the flapper valve member 22, as illustrated in **FIGURE 3**, is provided with an outwardly or downwardly extending projection or finger member or block 36.

While the aforenoted inflation valve assembly 10 has exhibited satisfactory field operation, it is noted that as a result of the provision of the plurality of circumferentially spaced upstanding projections or ears 34, the inflation valve assembly 10 is characterized by means of a sub-

stantially large height dimension or depth profile. Considered from a slightly different perspective, the height dimension or depth profile of the inflation valve assembly 10 is substantially increased, by means of the provision or presence of the plurality of circumferentially spaced upstanding projections or ears 34, when considered with respect to the height dimension or depth profile of the annular upstanding ring member 18 within which the valve seat 30 is defined. This substantially large height dimension or depth profile of the inflation valve assembly 10 presents significant problems in connection with the logistics comprising the fabrication of the inflatable bladder member, not shown, of the dunnage or cargo air bag. More particularly, as a result of the second conventional **PRIOR ART** inflation valve assembly 10 being characterized by means of the aforenoted substantially large height dimension or depth profile, the sealing together of the opposite plies of the inflatable bladder member is rendered more difficult.

Still further, when structurally incorporating an inflation valve assembly into an inflatable bladder member, it is desirable, from an operational point of view, to locate the inflation valve assembly as close as possible to a corner region of the inflatable bladder member such that when the dunnage or cargo air bag is to be utilized in connection with the securing or bracing of cargo within the cargo holds of, for example, railroad cars, airplanes, ships, truck trailers, and the like, the inflation valve assembly is readily accessible in order to easily facilitate the bladder inflation operation. It is noted, however, that in connection with the second conventional **PRIOR ART** inflation valve assembly 10,

and more particularly, in light of the aforenoted substantially large height dimension or depth profile of the inflation valve assembly 10, the inflation valve assembly 10 is not able to be located relatively close to the corner region of the inflatable bladder member because the opposite plies of the inflatable bladder member would not be capable of being brought together sufficiently in order to achieve the sealing of the same.

Accordingly, a need exists in the art for a new and improved inflation valve assembly wherein the same comprises relatively simple structure, comprising a relatively small number of cooperating parts, so as to comprise an inflation valve assembly which is structurally similar to the second conventional **PRIOR ART** inflation valve assembly comprising the flapper valve mechanism, as opposed to being structurally similar to the first conventional **PRIOR ART** inflation valve assembly comprising the spring-biased valve stem mechanism, and wherein further, while the overall structural features of the second conventional **PRIOR ART** inflation valve assembly are therefore sought to be retained, the substantially large height dimension or depth profile, characteristic of the second conventional **PRIOR ART** inflation valve assembly, is, however, able to effectively be reduced such that the new and improved inflation valve assembly can be structurally incorporated within the inflatable bladder member of the dunnage or cargo air bag at, for example, the operationally desirable corner position of the inflatable bladder member so as to in fact be capable of readily facilitating the inflation of the dunnage or cargo air bag when the dunnage or cargo air bag is to be utilized for securing or bracing cargo within the cargo

holds of, for example, railroad cars, truck trailers, ships, airplanes, and the like.

OBJECTS OF THE INVENTION

Accordingly, it is an object of the present invention to provide a new and improved inflation valve assembly for incorporation within the inflatable bladder member of a dunnage or cargo air bag.

Another object of the present invention is to provide a new and improved inflation valve assembly for incorporation within the inflatable bladder member of a dunnage or cargo air bag so as to effectively overcome the various operational drawbacks characteristic of conventional **PRIOR ART** inflation valve assemblies.

An additional object of the present invention is to provide a new and improved inflation valve assembly, for incorporation within the inflatable bladder member of a dunnage or cargo air bag, wherein the new and improved inflation valve assembly is characterized by means of a substantially small or reduced height dimension or depth profile.

A further object of the present invention is to provide a new and improved inflation valve assembly, for incorporation within the inflatable bladder member of a dunnage or cargo air bag, wherein the new and improved inflation valve assembly is characterized by means of a substantially

small or reduced height dimension or depth profile whereby the new and improved inflation valve assembly can be structurally incorporated within the inflatable bladder member of a dunnage or cargo air bag without adversely affecting the sealing operation of the inflatable bladder member of the dunnage or cargo air bag.

A yet further object of the present invention is to provide a new and improved inflation valve assembly, for incorporation within the inflatable bladder member of a dunnage or cargo air bag, wherein the new and improved inflation valve assembly is characterized by means of a substantially small or reduced height dimension or depth profile whereby the new and improved inflation valve assembly can be structurally incorporated within the inflatable bladder member of a dunnage or cargo air bag so as to readily permit or facilitate the sealing operation of the inflatable bladder member of the dunnage or cargo air bag as defined between oppositely disposed plies of the inflatable bladder member of the dunnage or cargo air bag.

A last object of the present invention is to provide a new and improved inflation valve assembly, for incorporation within the inflatable bladder member of a dunnage or cargo air bag, wherein the new and improved inflation valve assembly is characterized by means of a substantially small or reduced height dimension or depth profile which enables the new and improved inflation valve assembly to be located within the desirably accessible corner region of the inflatable bladder member so as to readily facilitate the inflation of the dunnage or cargo air bag when the dunnage or cargo air

bag is to be utilized for securing or bracing cargo within the cargo holds of, for example, railroad cars, airplanes, ships, truck trailers, and the like.

SUMMARY OF THE INVENTION

The foregoing and other objectives are achieved in accordance with the teachings and principles of the present invention through the provision of a new and improved inflation valve assembly, for a dunnage or cargo air bag, wherein the new and improved inflation valve assembly comprises an annular flange member, the undersurface portion of which is adapted to be heat-sealed to the interior surface portion of one of the plies comprising the inflatable bladder. An externally threaded nipple portion of the inflation valve assembly is adapted to project outwardly through means of a suitable aperture formed within the ply of the inflatable bladder, as well as suitable apertures formed within the one or more paper plies comprising the dunnage or cargo air bag, such that when a suitable inflation nozzle is fluidically connected to the nipple portion of the inflation valve assembly, pressurized air can be conducted into the interior of the inflatable bladder so as to inflate the same. In addition, the inflation valve assembly also has a substantially C-shaped upstanding ring member integrally disposed upon the upper surface portion of the annular flange member, and a substantially planar, disc-type flapper valve member, having a substantially circular configuration, has an end portion which is adapted to be fixedly secured upon an arcuate por-

tion of the upper surface portion of the annular flange member by means of a fixation bar which extends along a chordal extent of the annular flange member. Still further, the radially interior peripheral wall portion of the annular upstanding ring member is provided with an inner flange member which effectively serves as a valve seat for the substantially planar, disc-type flapper valve member when the flapper valve member is disposed in its **CLOSED** position or state. It is also noted that the substantially planar, disc-type flapper valve member is fabricated from a suitable rubber composition, and accordingly, that portion of the substantially planar, disc-type flapper valve member, which is disposed immediately adjacent to the fixation bar, inherently defines a living hinge portion by means of which the flapper valve member can be readily pivotally moved between its **CLOSED** and **OPENED** positions.

In accordance with the unique and novel structure characteristic of the new and improved inflation valve assembly of the present invention, opposite end portions of the fixation bar project radially inwardly toward each other so as to effectively define a pair of oppositely disposed detents. Accordingly, when the substantially planar, disc-type flapper valve member is moved from its **CLOSED** position to its fully **OPENED** position, opposite side portions of the flapper valve member will encounter the oppositely disposed detents of the fixation bar, the opposite side portions of the flapper valve member will accordingly be partially deformed as a result of being compressed radially inwardly by means of such oppositely disposed detents of the fixation bar, and the flapper valve member will therefore effectively be able to be

moved past such oppositely disposed detents. Subsequently, once the flapper valve member has in fact moved past such oppositely disposed detents of the fixation bar, the opposite side portions of the flapper valve member will effectively regain their normal, non-compressed states such that the oppositely disposed detents will serve to retain the flapper valve member at its **OPENED** position or state. In this manner, the inflation valve assembly is then able to have an inflation nozzle member fluidically mated with the nipple portion of the inflation valve assembly so as to facilitate inflation of the inflatable dunnage or cargo air bag bladder. In view of the fact that the oppositely disposed detents, for maintaining the flapper valve member at its **OPENED** position or state, have effectively been integrally incorporated within the fixation bar, the need for the upstanding projections or ears, disposed upon the annular ring member of the second conventional **PRIOR ART** inflation valve assembly, has been rendered unnecessary, and accordingly, the height dimension or depth profile of the new and improved inflation valve assembly of the present invention is able to be substantially reduced so as to enable the new and improved inflation valve assembly of the present invention to achieve the aforenoted desirable objectives with respect to the sealing of the inflatable bladder and the location of the inflation valve assembly within the corner region of the dunnage or cargo air bag.

BRIEF DESCRIPTION OF THE DRAWINGS

Various other objects, features, and attendant ad-

vantages of the present invention will be more fully appreciated from the following detailed description when considered in connection with the accompanying drawings in which like reference characters designate like or corresponding parts throughout the several views, and wherein:

FIGURE 1 is a cross-sectional view of a first, conventional **PRIOR ART** inflation valve assembly having a spring-biased valve stem mechanism incorporated therein for providing the inflation valve assembly with its **CLOSED** and **OPENED** operative states or positions;

FIGURE 2 is a side perspective view of a second, conventional, **PRIOR ART** inflation valve assembly having a flapper valve member mounted thereon, and showing the various operative components thereof, wherein the flapper valve member is illustrated as being disposed at its **CLOSED** and **SEATED** position;

FIGURE 3 is a side perspective view, similar to that of **FIGURE 2**, of the second, conventional, **PRIOR ART** inflation valve assembly as illustrated in **FIGURE 2** showing, however, the flapper valve member disposed at its **OPENED** and **UNSEATED** position;

FIGURE 4 is an end perspective view, corresponding with **FIGURES 2** and **3**, of the second, conventional, **PRIOR ART** inflation valve assembly as illustrated within **FIGURES 2** and **3**, and likewise showing the flapper valve member disposed at its **OPENED** and **UNSEATED** position as illustrated within **FIGURE 3**;

FIGURE 5 is a side perspective view of a new and improved inflation valve assembly, constructed in accordance with the principles and teachings of the present invention, showing the various operative components thereof, and in particular, having a flapper valve member mounted upon the inflation valve assembly wherein the flapper valve member is illustrated as being disposed at its **CLOSED** and **SEATED** position;

FIGURE 6 is a side perspective view, similar to that of **FIGURE 5**, of the new and improved inflation valve assembly of the present invention as illustrated in **FIGURE 5** showing, however, the flapper valve member disposed at its **OPENED** and **UNSEATED** position; and

FIGURE 7 is an end perspective view, corresponding with **FIGURES 5** and **6**, of the new and improved inflation valve assembly of the present invention as illustrated within **FIGURES 5** and **6**, and likewise showing the flapper valve member disposed at its **OPENED** and **UNSEATED** position as illustrated within **FIGURE 6**.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring now to the drawings, and more particularly to **FIGURES 5-7** thereof, a new and improved inflation valve assembly, constructed in accordance with the principles and teachings of the present invention, is disclosed and is generally indicated by the reference character 110. In con-

nection with the new and improved inflation valve assembly 110, it is initially noted that the new and improved inflation valve assembly 110 of the present invention, as illustrated within **FIGURES 5-7**, is seen to be somewhat structurally similar to the second, conventional, **PRIOR ART** inflation valve assembly 10 as illustrated within **FIGURE 2-4**, and accordingly, those various operative component parts of the new and improved inflation valve assembly 110 of the present invention, as illustrated within **FIGURES 5-7**, which are similar to those various operative component parts of the second, conventional, **PRIOR ART** inflation valve assembly 10, as illustrated within **FIGURE 2-4**, will be designated by reference characters which are similar to those utilized to designate the various operative component parts of the second, conventional, **PRIOR ART** inflation valve assembly 10, except that the reference characters for designating the various operative component parts of the new and improved inflation valve assembly 110 of the present invention will be within the 100 series.

More particularly, the new and improved inflation valve assembly 110, constructed in accordance with the principles and teachings of the present invention, is seen to comprise an annular flange member 112 wherein, for example, the undersurface portion 114 of the annular flange member 112 is adapted to be heat-sealed, such as, for example, by means of ultrasonic welding techniques, to an interior surface portion of one of the plies comprising an inflatable bladder, wherein the inflatable bladder may be similar to the inflatable bladder 62 as disclosed within the aforenoted patent to **Krier et al**. An externally threaded nipple portion 116 of the

inflation valve assembly 110 is integrally formed upon the undersurface portion 114 of the annular flange member 112 so as to extend downwardly therefrom, and in this manner, the threaded nipple portion 116 is adapted to project outwardly through a suitable aperture formed within the ply of the inflatable bladder to which the undersurface portion 114 of the annular flange member 112 is secured, as well as through suitable apertures formed within the one or more paper plies comprising the dunnage or cargo air bag. Accordingly, when a suitable inflation nozzle, not shown, is fluidically connected to the nipple portion 116 of the inflation valve assembly 110, pressurized air or compressed air can be conducted into the interior of the inflatable bladder so as to inflate the same. In addition to the aforenoted structure characteristic of the new and improved inflation valve assembly 110, it is further seen that the new and improved inflation valve assembly 110 also has a substantially annular upstanding ring member 118 which is integrally formed upon the upper surface portion 120 of the annular flange member 112 so as to extend upwardly therefrom, and in this manner, the upstanding ring member 118 is adapted to project inwardly into the inflatable bladder of the dunnage or cargo air bag so as to in fact be disposed internally within the inflatable bladder of the dunnage or cargo air bag.

Continuing further, and as can best be appreciated from **FIGURE 7**, a substantially planar, disc-type flapper valve member 122, having a substantially circular configuration, has an end portion 124 which is adapted to be fixedly secured upon the inflation valve assembly 110, however, contrary to the second conventional **PRIOR ART** inflation valve

assembly 10 as disclosed within **FIGURES 2-4**, the end portion 124 of the substantially planar, disc-type flapper valve member 122 is secured directly to an arcuate section 126 of the upper surface portion 120 of the annular flange member 112 by means of a fixation bar 128 which extends along a chordal extent of the upper surface portion 120 of the annular flange member 112. In particular, it is seen, as may best be appreciated from **FIGURES 5-7**, that the substantially annular upstanding ring member 118 actually has a substantially C-shaped configuration, whereby the substantially C-shaped upstanding ring member 118 defines terminal end portions 127,127 which are circumferentially spaced from each other so as to spatially accommodate the end portion 124 of the flapper valve member 122, as well as the fixation bar 128, therebetween. Accordingly, in view of the fact that the end portion 124 of the substantially planar, disc-type flapper valve member 122 is in fact secured directly to the arcuate section 126 of the upper surface portion 120 of the annular flange member 112, as opposed to being secured to an arcuate section of the annular upstanding ring member 118, such a structural interrelationship comprises a first factor by means of which the thickness dimension or depth profile of the entire inflation valve assembly 110 can be reduced as compared to, for example, the thickness dimension or depth profile of the second conventional **PRIOR ART** inflation valve assembly 10.

It is noted further that in connection with the mounting of the fixation bar 128 upon the arcuate section 126 of the upper surface portion 120 of the annular flange member 112, a pair of laterally separated, upstanding studs or rivets 129,129 may be integrally formed upon the arcuate section

126 of the upper surface portion 120 of the annular flange member 112. The studs or rivets 129,129 are adapted to extend upwardly through suitable apertures formed within the fixation bar 128, whereupon the terminal end portions of the studs or rivets 129,129 being heat sealed or otherwise terminated, the fixation bar 128 is fixedly secured upon the arcuate section 126 of the upper surface portion 120 of the annular flange member 112. Still further, and as can best be seen from **FIGURE 6**, the radially interior peripheral wall portion of the substantially C-shaped upstanding ring member 118 is provided with an inner flange member 130 which is effectively adapted to serve as a valve seat for the substantially planar, disc-type flapper valve member 122 when the flapper valve member 122 is disposed at its **CLOSED** position or state as substantially illustrated within **FIGURE 5**, and the inner flange member 130 is also seen to be disposed upon the upper end portion of the inner peripheral wall member 131 of the externally threaded nipple portion 116. The inner peripheral wall member 131 effectively defines a through-bore 133 which is fluidically connected to the free or distal end portion of the externally threaded nipple portion 116 whereupon the inflation nozzle, not shown, beiong fluidically connected to the nipple portion 116 of the inflation valve assembly 110, pressurized air or compressed air can be conducted into the interior of the inflatable bladder, through means of the through-bore 133, so as to inflate the same.

It is also noted that the substantially planar, disc-type flapper valve member 122 is fabricated from a suitable rubber composition, and accordingly, that portion of the substantially planar, disc-type flapper valve member 122,

which is disposed immediately adjacent to the fixation bar 128, inherently defines a living hinge portion 132 by means of which the flapper valve member 122 is adapted to be readily pivotally moved between its **OPENED** and **CLOSED** positions as respectively disclosed within **FIGURES 6** and **7,** and **FIGURE 5**. As can be additionally appreciated from **FIGURES 5-7**, the opposite ends of the fixation bar 128 are respectively provided with oppositely disposed, inwardly oriented detent members 134, and it can therefore be appreciated that when the substantially planar, disc-type flapper valve member 122 is moved from its **CLOSED** position as substantially illustrated in **FIGURE 5**, to its fully **OPENED** position as illustrated in **FIGURES 6** and **7**, the opposite side portions of the flapper valve member 122 will encounter the oppositely disposed, inwardly oriented detent members 134,134 of the fixation bar 128. In this manner, the opposite side portions of the flapper valve member 122 will accordingly be partially deformed as a result of being compressed radially inwardly by means of such detent members 134,134 whereupon the flapper valve member 122 will therefore effectively be able to be moved past such detent members 134,134.

Subsequently, once the side portions of the flapper valve member 122 have in fact moved past such detent members 134,134, the side portions of the flapper valve member 122 will effectively regain their normal, non-compressed states such that the detent members 134,134 will now serve to retain the flapper valve member 122 at its **OPENED** position or state as illustrated within **FIGUERS 6** and **7**. It is noted that in order to manually manipulate the flapper valve member 122 and to move the same from its **CLOSED** position as substantially

illustrated within **FIGURE 5**, to its fully **OPENED** position as illustrated within **FIGURES 6** and **7**, the external or undersurface portion of the flapper valve member 122 is preferably provided with an outwardly or downwardly extending projection or finger member or block, similar to the aforenoted outwardly or downwardly extending projection or finger block or member 36 utilized in conjunction with the flapper valve member 22 of the inflation valve assembly 10, although such a finger member or block, for use upon the flapper valve member 122, is not visible within **FIGURES 5-7**. It is noted further that once the flapper valve member 122 is retained at its **OPENED** position or state by means of the detent members 134,134, the inflation valve assembly 110 is then able to have an inflation nozzle member, not shown, fluidically mated with the nipple portion 116 of the inflation valve assembly 110 so as to facilitate inflation of the inflatable bladder of the dunnage or cargo air bag.

Accordingly, once the inflatable bladder of the dunnage or cargo air bag has in fact been inflated to its desirable extent, the inflation nozzle member, not shown, is withdrawn from its fluidic connection with the nipple portion 116 of the inflation valve assembly 110, and as a result of the relatively high internal pressurization of the inflatable bladder of the dunnage or cargo air bag, the air pressure disposed internally within the inflatable bladder of the dunnage or cargo air bag will force the flapper valve member 122 from its **OPENED** state or position, as illustrated within **FIGURES 6** and **7**, toward its **CLOSED** position or state as substantially illustrated within **FIGURE 5**. More particularly, it can be appreciated that the relatively high internal air pressure

disposed within the inflatable bladder of the dunnage or cargo air bag will be sufficient enough to move the flapper valve member 122 from its **OPENED** state or position, as illustrated within **FIGURES 6** and **7**, toward its **CLOSED** position or state as substantially illustrated within **FIGURE 5**, as a result of causing the side portions of the flapper valve member 122 to effectively undergo deformation with respect to the oppositely disposed detent members 134,134 of the fixation bar 128, and thereby overcome the retention force of the detent members 134,134 with respect to the side portions of the flapper valve member 122, whereby the opposite side portions of the flapper valve member 122 can move past the oppositely disposed detent members 134,134 of the fixation bar 128. In this manner, the movement of the flapper valve member 122 to its **CLOSED** position or state, as substantially illustrated within **FIGURE 5**, whereby the flapper valve member 122 is effectively disposed upon its valve seat 130, will prevent the undesirable discharge of the pressurized air from the interior of the inflatable bladder of the dunnage or cargo air bag such that the dunnage or cargo air bag does not experience undesirable deflation. Subsequently, a suitable threaded cap, not shown, can be threadedly engaged upon the threaded nipple portion 116 of the inflation valve assembly 110 so as to permanently retain the pressurized air within the inflatable bladder of the dunnage or cargo air bag, and thereby maintain the dunnage or cargo air bag in its inflated state, until deflation of the dunnage or cargo air bag is in fact desired.

In light of the foregoing, it is to be specifically noted and emphasized further that in view of the fact that the opposite ends of the fixation bar 128 are provided with

the detent members 134,134 for encountering and operatively engaging the side portions of the flapper valve member 122 so as to releasably maintain the flapper valve member 122 at its **OPENED** position or state, as opposed to the provision of the upstanding projections or ears 34,34 upon the annular ring member 18 of the first conventional **PRIOR ART** inflation valve assembly 10, such a structural interrelationship comprises a second factor by means of which the thickness dimension or depth profile of the entire inflation valve assembly 110 can be reduced as compared to, for example, the thickness dimension or depth profile of the second conventional **PRIOR ART** inflation valve assembly 10. Accordingly, it is to be noted further that this second factor, comprising the location of the detent members 134,134 upon the opposite ends of the fixation bar 128, and by means of which the thickness dimension or depth profile of the entire inflation valve assembly 110 can be reduced as compared to, for example, the thickness dimension or depth profile of the second conventional **PRIOR ART** inflation valve assembly 10, operatively cooperates with the aforenoted first factor, comprising the mounting of the fixation bar 128 directly upon the upper surface portion 120 of the annular flange member 112, so as to contribute further to the effective reduction in the depth profile or thickness dimension of the entire inflation valve assembly 110 as compared to, for example, the thickness dimension or depth profile of the second conventional **PRIOR ART** inflation valve assembly 10.

Thus, it may be seen that in accordance with the principles and teachings of the present invention, there has been provided a new and improved inflation valve assembly

wherein the relatively simple structure, comprising a relatively small number of cooperating parts, of the conventional **PRIOR ART** inflation valve assembly has been retained, however, contrary to the structural features of such conventional **PRIOR ART** inflation valve assembly, the substantially large height dimension or depth profile, characteristic of the conventional **PRIOR ART** inflation valve assembly, has effectively been able to be reduced such that the new and improved inflation valve assembly can be structurally incorporated within the inflatable bladder member of the dunnage or cargo air bag at, for example, the operationally desirable corner position of the inflatable bladder member so as to in fact be capable of readily facilitating the inflation of the dunnage or cargo air bag when the dunnage or cargo air bag is to be utilized for securing or bracing cargo within the cargo holds of, for example, railroad cars, airplanes, ships, truck trailers, and the like.

Obviously, many variations and modifications of the present invention are possible in light of the above teachings. For example, while the inflation valve has been disclosed as being used in conjunction with an inflatable bladder adapted to be disposed internally within an outer bag fabricated from a plurality of paper plies, the inflatable bladder may alternatively be disposed within an outer bag which may be fabricated from materials other than paper, or alternatively still further, the inflatable bladder may itself comprise the dunnage bag, that is, it need not be disposed or enclosed within an outer bag. In addition, the inflatable bladder may be fabricated from various different materials, such as, for example, **VALERON**®, polyethylene with

woven **NYLON**®, a single-ply **KRAFT**® paper laminated with polyethylene, and the like. Still further, while the flange portion of the inflation valve assembly has been noted as being fixedly mounted upon, or heat-sealed to, an interior surface portion of the inflatable bladder, it can likewise be mounted upon, or heat-sealed to, an exterior surface portion of the inflatable bladder. It is therefore to be understood that within the scope of the appended claims, the present invention may be practiced otherwise than as specifically described herein.